

WHAT IS CLAIMED IS:

1. An apparatus for monitoring a power amplifier coupled to a transmission medium, the apparatus comprising:
  - a detector circuit, coupled to the transmission medium, that generates first and second detector signals corresponding to fundamental and harmonic components,
  - 5 respectively, of a power amplifier output signal produced by the power amplifier; and
  - a comparing circuit, coupled to the detector circuit, that compares the first and second detector signals.
2. An apparatus according to Claim 1, wherein the comparing circuit is operative to generate a signal that indicates linearity of the power amplifier responsive to a comparison of the first and second detector signals.
3. An apparatus according to Claim 1, wherein the detector circuit is operative to generate the second detector signal without requiring phase information for the harmonic component.
4. An apparatus according to Claim 1, wherein the detector circuit comprises:
  - a directional coupler that couples the power amplifier to the antenna and that generates an output signal responsive to the power amplifier output signal; and
  - 5 a power detector, coupled to the directional coupler, that generates the first detector signal from the output signal generated by the directional coupler.
5. An apparatus according to Claim 4, wherein the detector circuit further comprises:
  - a filter, coupled to the transmission medium, that filters the power amplifier output signal to produce a filtered output signal; and

5 a power detector, coupled to the filter, that generates the second detector signal from the filtered output signal.

6. An apparatus according to Claim 5, wherein the filter is capacitively coupled to the transmission medium.

7. An apparatus according to Claim 4:  
wherein the directional coupler comprises a first directional coupler that couples the power amplifier to the antenna and that generates a first output signal responsive to the power amplifier output signal;

5 wherein the power detector comprises a first power detector, coupled to the first directional coupler, that generates the first detector signal from the first output signal; and

wherein the detector circuit further comprises:

10 a second directional coupler that couples the power amplifier to the antenna and that generates a second output signal; and

a second power detector, coupled to the second directional coupler, that generates the second detector signal from the second output signal.

8. An apparatus according to Claim 7, wherein the first output signal corresponds to a forward fundamental component, wherein the second output signal corresponds to a reflected harmonic component, and wherein the second directional coupler generates a third output signal corresponding to a reflected fundamental component.  
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9. An apparatus according to Claim 8, further comprising a third power detector, coupled to the second directional coupler, that processes the third output signal to determine power reflected to the power amplifier.

10. An apparatus according to Claim 1, wherein the detector circuit comprises:

a filter, coupled to the transmission medium, that filters the power amplifier output signal to produce a filtered output signal; and

5 a power detector, coupled to the filter, that generates the second detector signal from the filtered output signal.

11. An apparatus according to Claim 10, wherein the filter is capacitively coupled to the transmission medium.

12. An apparatus according to Claim 1, wherein the detector circuit comprises:

a directional coupler that couples the power amplifier to the antenna and that generates an output signal; and

5 a power detector, coupled to the directional coupler, that generates the second detector signal from the directional coupler output signal.

13. An apparatus according to Claim 1, wherein the first and second detector signals represent first and second powers for the fundamental and harmonic components, respectively.

14. An apparatus according to Claim 13, wherein the first detector signal represents a forward power for the fundamental component.

15. An apparatus according to Claim 14, wherein the second detector signal represents a reflected power for the harmonic component.

16. An apparatus according to Claim 1, wherein the second detector signal comprises a plurality of second detector signals, respective ones of which correspond to respective harmonic components of the power amplifier output signal.

17. An apparatus, comprising:
- an antenna;
- a power amplifier that generates a power amplifier output signal in a transmission medium coupling the power amplifier to the antenna;
- 5 a detector circuit, coupled to the transmission medium, that generates first and second detector signals corresponding to fundamental and harmonic components, respectively, of the power amplifier output signal; and
- a control circuit, coupled to the detector circuit and operatively associated with the power amplifier, that controls the power amplifier responsive to a comparison of
- 10 the first and second detector signals.

18. An apparatus according to Claim 17, wherein the control circuit controls linearity of the power amplifier responsive to a comparison of the first and second detector signals.

19. An apparatus according to Claim 18, wherein the control circuit, responsive to a comparison of the first and second detector signals, controls at least one of a level of an input signal applied to the power amplifier and a DC bias of the power amplifier.

20. An apparatus according to Claim 19, wherein the control circuit comprises:
- a baseband processor that generates a data signal; and
- a modulator, coupled to the baseband processor, that receives the data signal
- 5 and modulates the received data signal to generate the input signal such that the level of the input signal varies responsive to a level control signal applied to the modulator,
- wherein the power amplifier receives the input signal and generates the power amplifier output signal therefrom, and wherein the baseband processor is responsive

10 to the detector circuit to generate the level control signal applied to the modulator responsive to a comparison of the first and second detector signals.

21. An apparatus according to Claim 20, wherein the baseband processor is further operative to apply a bias control signal to the power amplifier responsive to a comparison of the first and second detector signals.

22. An apparatus according to Claim 19, wherein the control circuit comprises a variable gain circuit, responsive to the detector circuit, that generates the input signal with a gain that is dependent upon a comparison of the first and second detector signals.

23. An apparatus according to Claim 19, wherein the control circuit comprises a bias control circuit, responsive to the detector circuit, that applies a bias control signal to the power amplifier responsive to a comparison of the first and second detector signals.

24. An apparatus according to Claim 17, wherein the detector circuit is operative to generate the second detector signal without requiring phase information for the harmonic component.

25. An apparatus according to Claim 17, wherein the detector circuit comprises:

a directional coupler that couples the power amplifier to the antenna and that generates an output signal responsive to the power amplifier output signal; and

5 a power detector, coupled to the directional coupler, that generates the first detector signal from the output signal generated by the directional coupler.

26. An apparatus according to Claim 25:

wherein the directional coupler comprises a first directional coupler that couples the power amplifier to the antenna and that generates a first output signal responsive to the power amplifier output signal;

5 wherein the power detector comprises a first power detector, coupled to the first directional coupler, that generates the first detector signal from the first output signal; and

wherein the detector circuit further comprises:

10 a second directional coupler that couples the power amplifier to the antenna and that generates a second output signal; and

a second power detector, coupled to the second directional coupler, that generates the second detector signal from the second output signal.

27. An apparatus according to Claim 26, wherein the first output signal corresponds to a forward fundamental component, wherein the second output signal corresponds to a reflected harmonic component, and wherein the second directional coupler generates a third output signal corresponding to a reflected fundamental component.

28. An apparatus according to Claim 27, further comprising a third power detector circuit, coupled to the second directional coupler, that processes the third output signal to determine power reflected to the power amplifier.

29. An apparatus according to Claim 17, wherein the first detector signal represents a forward power for the fundamental component.

30. An apparatus according to Claim 29, wherein the second detector signal represents a reflected power for the harmonic component.

31. An apparatus according to Claim 17, wherein the first and second detector signals represent respective powers for the fundamental and harmonic components.

32. An apparatus according to Claim 17, wherein the detector circuit comprises:

5 a filter, coupled to the transmission medium, that filters the power amplifier output signal to produce a filtered output signal; and

a power detector, coupled to the filter, that generates the second detector signal from the filtered output signal.

33. An apparatus according to Claim 32, wherein the filter is capacitively coupled to the transmission medium.

34. An apparatus according to Claim 17, wherein the detector circuit comprises:

a directional coupler that couples the power amplifier to the antenna and that generates an output signal; and

5 a power detector, coupled to the directional coupler, that generates the second detector signal from the directional coupler output signal.

35. An apparatus according to Claim 17, wherein the second detector signal comprises a plurality of second detector signals, respective ones of which correspond to respective harmonic components of the power amplifier output signal.

36. A method, comprising:

generating first and second detector signals corresponding to respective fundamental and harmonic components of a power amplifier output signal produced in a transmission medium by a power amplifier; and

- 5 comparing the first and second detector signals to determine linearity of the power amplifier.

37. A method according to Claim 36, wherein the step of comparing comprises generating a signal that indicates linearity of the power amplifier.

38. A method according to Claim 36, wherein the step of generating first and second detector signals comprises the step of generating the second detector signal without using phase information for the harmonic component.

39. A method according to Claim 36, wherein the first and second detector signals represent respective powers for the fundamental and harmonic components.

40. A method according to Claim 36, wherein the first detector signal represents a forward power for the fundamental component.

41. A method according to Claim 36, wherein the second detector signal represents a reflected power for the harmonic component.

42. A method according to Claim 36, wherein the second detector signal comprises a plurality of second detector signals, respective ones of which correspond to respective harmonic components of the power amplifier output signal.

43. A method according to Claim 36, further comprising controlling linearity of the power amplifier responsive to a comparison of the first and second detector signals.

44. A method according to Claim 43, wherein the step of controlling comprises controlling, responsive to a comparison of the first and second detector





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